Lending the Public Health Voice to Protect Children's Health and Futures

Washington State Public Health Association

11th Annual Joint Conference on Health

"Advocacy and Action - Public Health Walks Its Talk"

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Introduction

Moderator: Nancy Dickeman, MA

Science and Health Risks

Steven G. Gilbert, PhD, DABT

Lending the Public Health Voice to Protect Children's Health and Futures

Laurie Valeriano

Lending the Public Health Voice: Advocacy and Personal Action

Sandy Rock, MD, MPH

Infant & Child Health

Convergence of Issues

- Vision of Child Health
- Knowledge of Reproductive and Developmental Toxicology
- Policy Approach within an ethical framework
  - Social responsibilities
  - No technical solutions
  - Restriction of freedoms
  - Precautionary Principle

Vision for Child Health

"Children can develop and mature in an environment that allows them to reach and maintain their full potential."

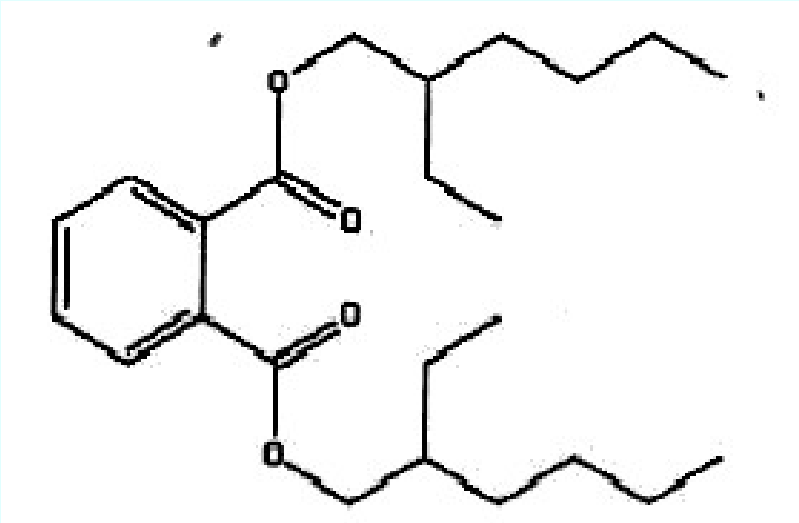
Susceptibility of Children

- Dose Response Issues
- Higher metabolic rate
- Different nutritional requirements
- Rapidly dividing & migrating cells
- Immature organs

Case Studies

- DEHP/PVC
- PBDEs

Di-ethylhexyl phthalate (DEHP)



- Phthalate Plasticizer
- 2 million tons/year
- Ubiquitous exposure
- General Uses
  - Building materials
  - Clothing
  - Packaging
  - Medical Devices

DEHP in Medical Devices

- Used to make PVC plastic flexible
- 20 - 40 % by weight; up to 80% in tubing.
- Not bound to the vinyl; readily leaches.
- Leaching increased by lipid-like content of fluids, temperature, agitation, storage time.

DEHP Exposure

- Intravenous fluids, medications
- Exchange Transfusions
- Replacement Transfusions
- Extra Corporeal Membrane Oxygenation
- Dialysis
- Surgery; e.g. large exposures during cardiopulmonary bypass
- Hyper-alimentation
- Gastric Feeding, NG Tubing
- Artificial Ventilation

DEHP Absorption/Metabolism

- Children absorb more DEHP from the intestinal tract than adults
- Lack of blood-testis barrier in fetus, neonate, pre-pubertal child
- DEHP converted to MEHP in all species

DEHP Health Effects

Developmental toxicity—animal studies

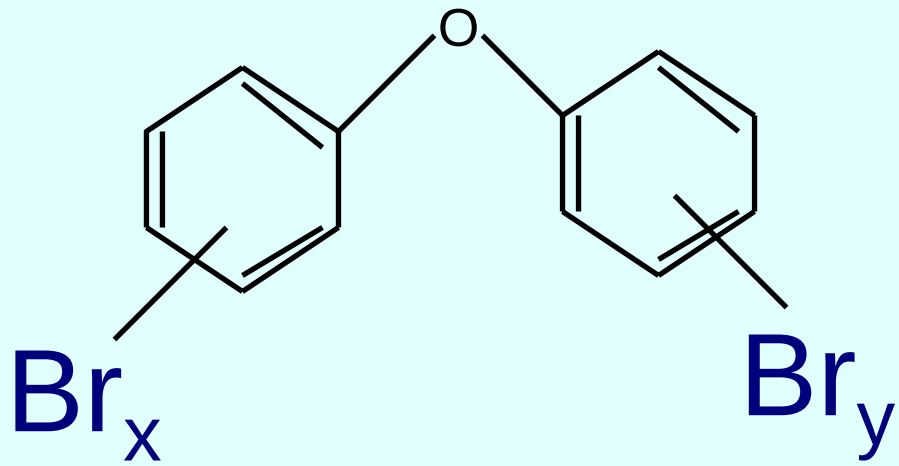
- Skeletal, cardiovascular, eye, male reproductive tract, neural tube defects
- Decreased intrauterine and postnatal growth
- Alter sexual differentiation of male reproductive system
- Infertility in males and females
- **Most Sensitive System: Immature Male Reproductive Tract**

Agency Concerns

- NTP panel - "serious concern" for the possibility of adverse effects on the developing reproductive tract of male infants
- Developed a “tolerable intake” (TI) for oral and parenteral exposure, below which no adverse effects expected
  - 0.6 mg DEHP/kg/day for parenteral exposures
  - 0.04 mg DEHP/kg/day for oral exposures

Structure of PBDEs

PolyBrominated Diphenyl Ether



X & Y are number of Bromine atoms
Common Penta, Octa, and Deca

Purpose of PBDEs

PolyBrominated Diphenyl Ether

- Fire kills more than 3,000/year
- Injures more than 20,000
- $11 billion in damage
- Flame retardants
- Used in many consumer products

How much PBDEs are used?

Millions of lbs used/year (2001)

PBDEs	Americas	Europe	Asia
Deca-	53.9	16.7	50.6
Octa-	3.3	1.3	3.3
Penta-	15.6	0.33	0.33
Total –	72.8	18.4	54.2

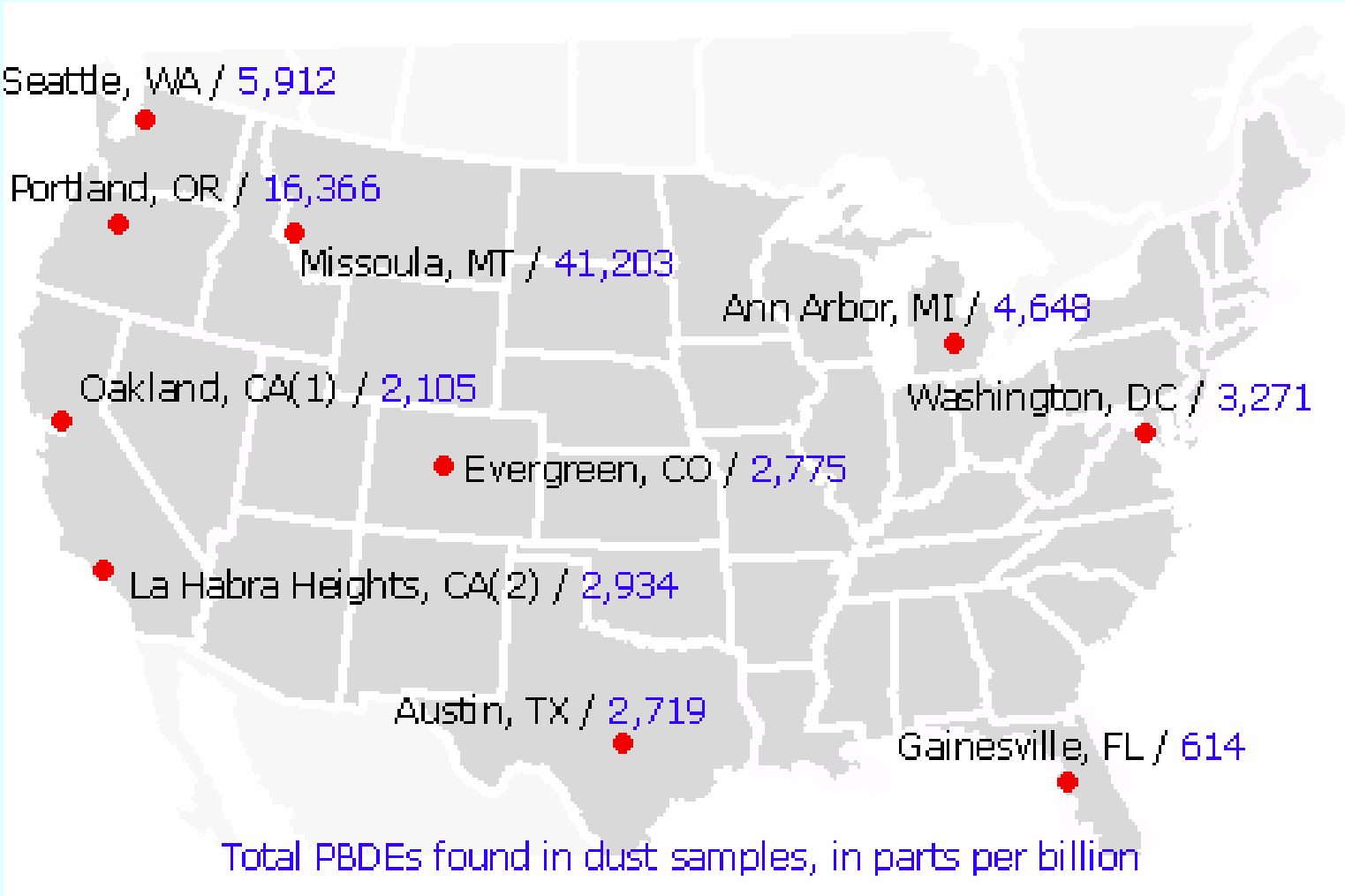
Total world-wide 148.3 M lbs/yr

Data from BSEF (2001)

Bioavailability of PBDEs

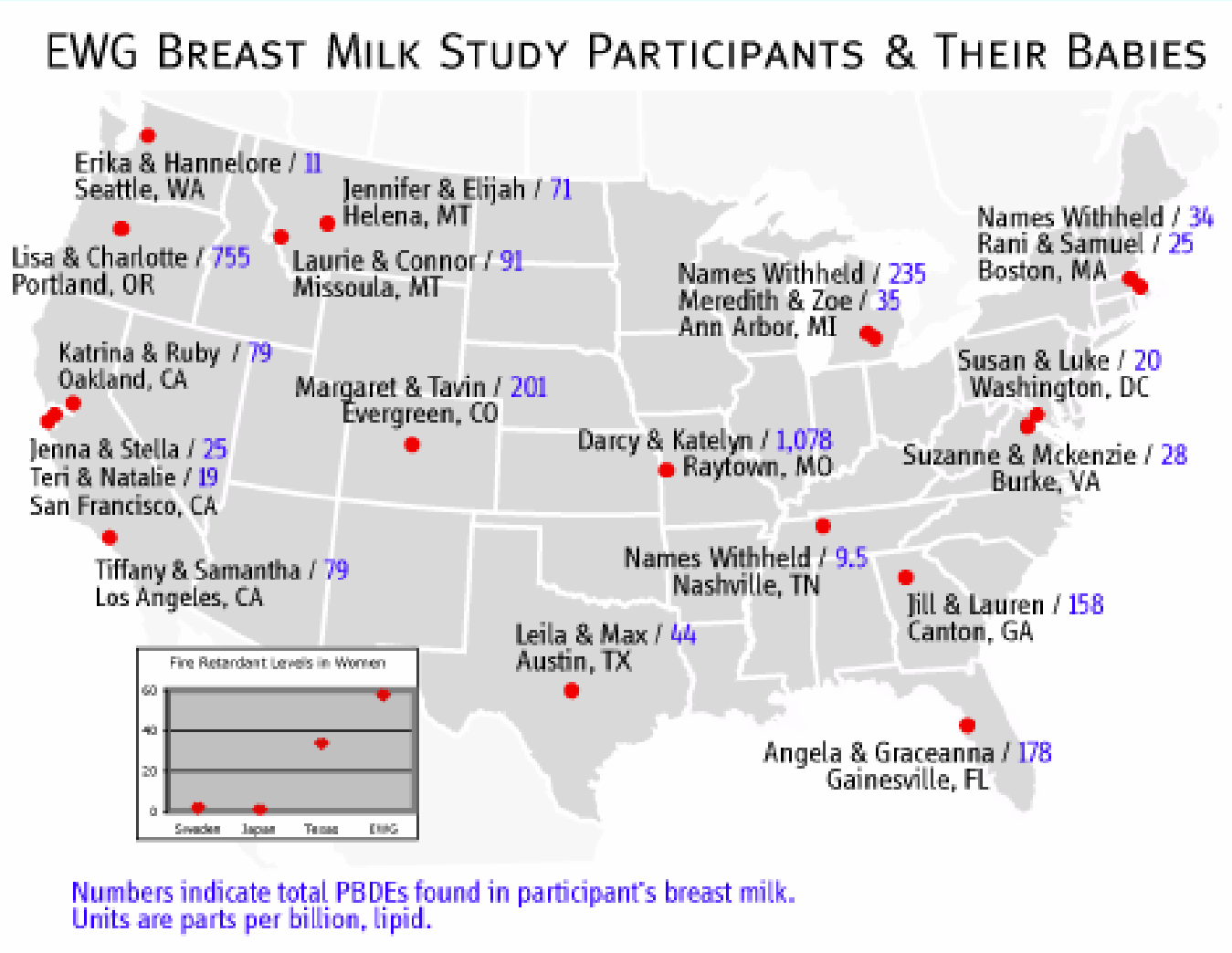
- Found in animals
  - Increase in fish
  - Increase in whales
  - Sewage sludge
  - PCBs Found in Lake Washington Fish (PBDEs next?)
- Found in human (breast milk)

PBDEs in House Dust (ppb)



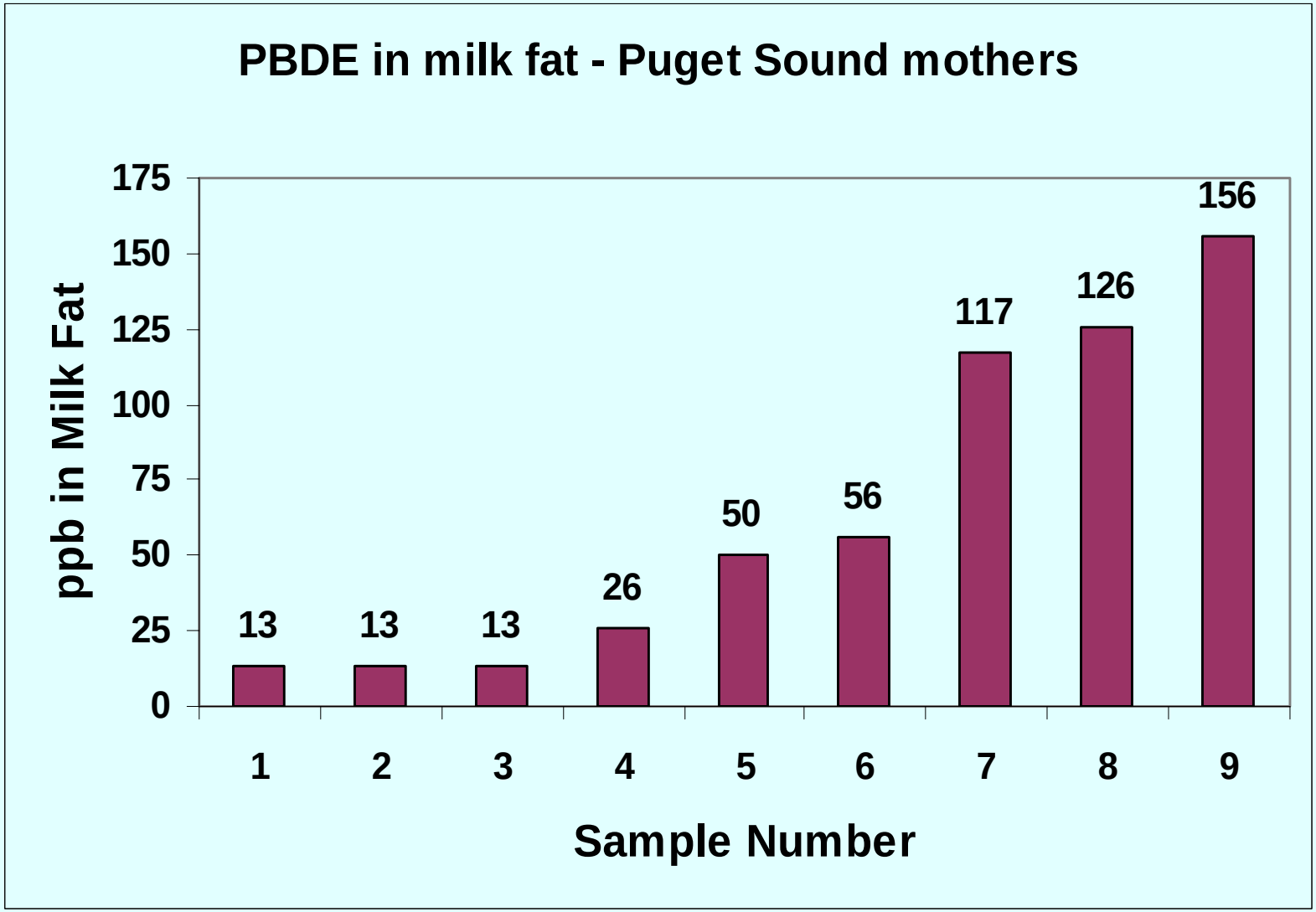
From EWG - Toxic Fire Retardants Contaminate American Homes - http://www.ewg.org/reports/inthedust/summary.php

PBDEs in Breast Milk (ppb)



From EWG - Toxic Fire Retardants in Breast Milk from American Mothers - http://www.ewg.org/reports/mothersmilk/es.php

PBDEs In Milk Fat

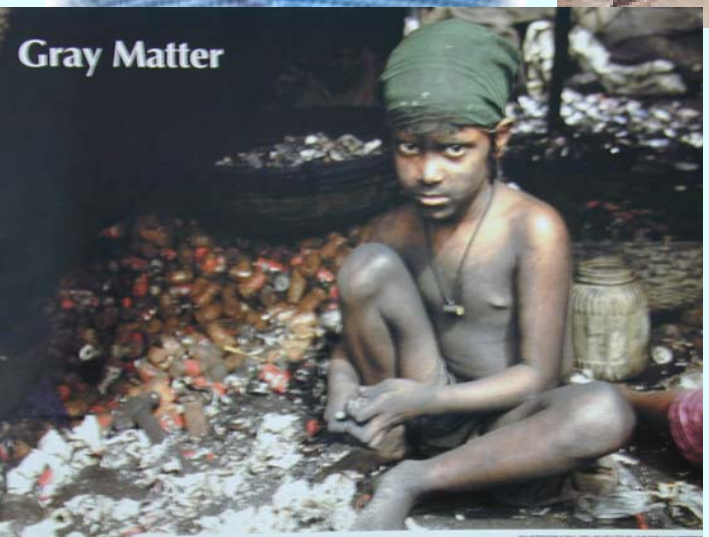


(adapted from Northwest Environmental Watch, 2004)

Health Effects of PBDEs

- **Similar to PCBs (Polychlorinated biphenyls)**
- **PBT (Persistent Bioaccumulative Toxicant)**
- **No human data**
- **Animals studies indicate**
  - **Effects thyroid hormone levels**
  - **Neurobehavioral toxicity**
    - **Effects development - alters Behavior**
    - **Impairs memory and learning**
  - **Delays sexual development**

The Potential of Children



Public Health & Children

Questions or Comments?

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Authorship Information

Steven G. Gilbert, PhD, DABT
Director, INND
E-mail: sgilbert@innd.org
www.asmalldoseof.org

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